

CLAIMS:

1. Non-fragmenting pressure relief apparatus comprising:
a rupture disc having a central section and a peripheral flange section,
said central section of the disc having a rupturable line of weakness extending around
5 a part of the central section of the disc,
said line of weakness having opposed end regions in spaced relationship that define
a unitary hinge portion of the central section of the disc therebetween, each
end region of the line of weakness having an outermost terminal end,
said line of weakness defining the part of the central section of the disc that ruptures
10 along said line of weakness and opens upon application of a force of at least
a predetermined magnitude to said central section of the disc,
the end regions of the line of weakness converging toward one another, and then
diverging away from one another as the outermost terminal ends of the end
regions of the line of weakness are approached.
- 15 2. Apparatus as set forth in claim 1, wherein the end regions continuously
converge toward one another and continuously diverge away from one another.
3. Apparatus as set forth in claim 1, wherein each of the end regions of the line
of weakness are of curvilinear configuration.
4. Apparatus as set forth in claim 3, wherein each of said curvilinear end regions
20 of the line of weakness is of substantially semi-circular C-shaped configuration.
5. Apparatus as set forth in claim 4, wherein the radius of each of the semi-
circular end regions of the line of weakness is less than the distance between the closest
points to one another on opposed semi-circular end regions of the line of weakness.

6. Apparatus as set forth in claim 1, wherein said central section of the rupture disc has a bulged portion presenting opposed convex and concave surfaces, said line of weakness extending around a peripheral portion of the bulged portion of the central section of the rupture disc.

5 7. Apparatus as set forth in claim 1, wherein said line of weakness is defined by a series of elongated, end-to-end spaced slits extending through the central section of the rupture disc, said slits being separated from one another by individual webs that are unitary with the remainder of the central section of the disc.

8. Apparatus as set forth in claim 7, wherein each of said slits is of substantially
10 greater length than the width of each web between respective ends of adjacent slits.

9. Apparatus as set forth in claim 8, wherein the slits of the end regions of the line of weakness are of lesser length than the length of the slits of the remainder of the line of weakness.

10. Apparatus as set forth in claim 9, wherein each of said end region slits is less
15 than one half the length of the length of the slits in said remainder of the line of weakness.

11. Apparatus as set forth in claim 1, wherein is provided a pair of said rupture discs, each of said discs having a line of weakness, the lines of weakness in respective discs being in general alignment with respect to one another.

12. Apparatus as set forth in claim 11, wherein each of said lines of weakness is
20 defined by a series of elongated, end-to-end spaced slits extending through the central section of each rupture disc, the slits of each of said lines of weakness being separated from one another by individual webs that are unitary with the remainder of the central section of a respective disc, the slits of each of said lines of weakness being aligned with one another.

13. Non-fragmenting pressure relief apparatus comprising:

a rupture disc having a central section and a peripheral flange section, said central

section of the rupture disc having opposed faces,

said central section of the disc being provided with a rupturable line of weakness

5 having a segment extending around a major part of the central section of the disc,

said segment of the line of weakness having opposed terminal extremities;

a pair of reinforcing panels secured to one face of the central section of the rupture

disc, each of said panels being aligned with a respective terminal extremity

10 of the line of weakness segment,

each of said reinforcing panels being provided with an end region line of weakness

in disposition presenting an extension of respective terminal extremities of the line of weakness segment,

said end region lines of weakness being in spaced relationship to define a unitary

15 hinge portion of the central section of the disc therebetween, each end region line of weakness having an outermost end,

said end region lines of weakness converging toward one another and then diverging

away from one another as said outermost end of the end region lines of weakness are approached.

20 14. Apparatus as set forth in claim 13, wherein the end regions continuously converge toward one another and continuously diverge away from one another.

15. Apparatus as set forth in claim 13, wherein each of the end regions of the line of weakness are of curvilinear configuration.

16. Apparatus as set forth in claim 15, wherein each of said curvilinear end regions of the line of weakness is of substantially semi-circular C-shaped configuration.

17. Apparatus as set forth in claim 13, wherein said panels are a part of a butterfly shaped support element secured to said one face of the central segment of the rupture disc
5 having a unitary sector extending between and interconnecting the panel portions thereof.

18. Apparatus as set forth in claim 17, wherein said sector of the butterfly shaped element extends across and is located in alignment with the hinge portion of the central segment of the rupture disc.

19. Non-fragmenting pressure relief apparatus comprising:

a first rupture disc having a central section and a peripheral flange section;

a second rupture disc having a central section and a peripheral flange section,

each of said first and second rupture discs having a central section and a peripheral

5 flange section,

the central section of said first and second rupture discs each being provided with a

rupturable line of weakness having a segment extending around a major part

of the central section of respective first and second rupture discs,

said line of weakness segments of the first and second rupture discs being positioned

10 in aligned complementary relationship,

the central section of one of said first and second rupture discs having opposed faces,

a pair of reinforcing panels secured to one face of the central section of said one of

the first and second rupture discs, each of said panels being aligned with a

respective terminal extremity of the line of weakness segment in said one

15 rupture disc,

each of said reinforcing panels being provided with an end region line of weakness

in disposition presenting an extension of respective terminal extremities of

the line of weakness segment in said one rupture disc,

said end region lines of weakness being in spaced relationship to define a unitary

20 hinge portion of the central section of said one rupture disc therebetween,

each end region line of weakness having an outermost end,

said end region lines of weakness converging toward one another and then diverging

away from one another as said outermost end of the end region lines of

weakness are approached,

the terminal extremities of the line of weakness segment of the other of said first and second rupture discs terminating at the commencement of the line of weakness end regions in said panels on said one of the first and second rupture discs,

5 20. Apparatus as set forth in claim 19, wherein said panels are a part of a butterfly shaped support element secured to said one face of the central segment of said one of the first and second rupture discs, said element having a unitary sector extending between and interconnecting the panel portions thereof.

10 21. Apparatus as set forth in claim 20, wherein said sector of the butterfly shaped element extends across and is located in alignment with the hinge portion of the central segment of the rupture disc.

 22. Apparatus as set forth in claim 19, wherein said panels are spot welded to said one face of said one of the first and second rupture discs.

15 23. Apparatus as set forth in claim 19, wherein each of said lines of weakness is defined by a series of elongated end-to-end spaced slits extending through the central section of the rupture disc, said slits being separated from one another by individual webs that are unitary with the remainder of the central section of the disc.

 24. Apparatus as set forth in claim 23, wherein each of said slits is of substantially greater length than the width of each web between respective ends of adjacent slits.

20 25. Apparatus as set forth in claim 24, wherein the end region slits are of lesser length than the length of the slits of the remainder of the lines of weakness.